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AUTHOR Barnes, Laura L. B.; Bull, Kay S.; Campbell, N. Jo; Perry, Katye M.

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ABSTRACT

This study examined the relationship among beliefs about grades and teaching goals of college faculty, along with the extent to which there exist systematic differences among the academic disciplines with respect to these beliefs and goals. A national sample of 442 undergraduate teaching faculty responded to a survey asking them to rate the importance of 6 clusters of teaching goals. The survey also measured orientations toward a preference for norm-referenced or criterion-referenced grading, and beliefs about using grades to sort and select students on the basis of achievement. The results indicated that faculty in hard, pure disciplines (such as math and science) tended to believe more strongly in the gatekeeping function of grades (the sorting and selecting of students) than did faculty in soft, applied life disciplines (such as education) and soft, pure, nonlife disciplines (such as history). Faculty who viewed their primary role as one of teaching students subject matter facts and principles held stronger gatekeeping attitudes than did faculty who identified their primary teaching role as one of fostering student development and personal growth. (Contains 14 references.) (MDM)

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Running head: DISCIPLINE DIFFERENCES IN PHILOSOPHY

Discipline-related differences in teaching and grading philosophies among undergraduate teaching faculty

Laura L. B. Barnes

Kay S. Bull

N. Jo Campbell

Katye M. Perry

Oklahoma State University

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Abstract

Prior research reveals that differential grading patterns exist among the academic disciplines. One explanation may lie in discipline-related differences in teaching goals and beliefs about the meaning grades should convey. A national sample (n=442) of undergraduate teaching faculty responded to a survey asking them to rate the importance of six clusters of teaching goals. The survey also measured orientations toward a preference for norm-referenced or criterion-referenced grading and beliefs about using grades to sort and select students on the basis of achievement. Results showed that faculty in hard pure disciplines (e.g., math and sciences) (based on Biglan's 1973 model) tended to believe more strongly in a gatekeeping function of grades (i.e., sorting and selecting) than did faculty in soft applied life (e.g., education) and soft pure nonlife (e.g., history) disciplines. Significant differences among the discipline groups were also found with respect to several of the teaching goals. Further, faculty who viewed their primary teaching role as one of teaching students facts and principles of the subject matter held stronger gatekeeping attitudes than did faculty who identified their primary teaching role as one of fostering student development and personal growth. Differences in teaching and assessment philosophy were in expected directions and may help to explain some of the discipline related differences reported to exist in assigning grades.

Discipline-related differences in teaching and grading philosophies among undergraduate teaching faculty

Research has indicated that differential grading patterns exist among the academic disciplines (Goldman & Widawski, 1976; Strenta & Elliott, 1987; Summerville, Ridley, & Maris, 1990). One explanation for observed differences in grading stringency among the academic disciplines has been called "adaptation-level theory" (Goldman & Hewitt, 1975; Goldman & Widawski, 1976; Milton, Pollio, & Eison, 1986; Strenta & Elliott, 1987). This theory suggests that differential grading standards have evolved as a result of mutual adaptation on the part of both faculty and students. Academic fields with a reputation for tough grading attract and retain as majors only those students who are willing and able to compete for academic success in these fields. Consequently, students who are less academically competitive are attracted to less demanding disciplines. This theory has received support from research that found that those disciplines that awarded higher grades tended to have majors with relatively lower pre-college achievement as measured by SAT scores (Goldman & Widawski, 1976; Strenta & Elliott, 1987).

The current study presents an alternative perspective to adaptation-level theory and proposes that at least some of the between discipline variability in grade elevations is attributable to measurable differences in beliefs faculty hold about the meaning grades should convey and how grades relate to learning. The frame of reference used for assigning meaning to grades is one aspect of meaning that differentiates among faculty (Barnes, 1997; Geisinger & Rabinowitz, 1982). Two common frames of reference described in the student assessment literature are norm-referenced and criterion-

referenced. Norm-referenced grading involves an explicit acknowledgment that individual performance is given meaning in comparison to the performance of others. "Curving the grades" is a classic example of norm-referenced grading. Criterion-referenced grading, on the other hand, compares student performance to established absolute standards of performance, not to the performance of other students. Percentage-based grading with minimum passing percentages set by the evaluator is often cited as an example of criterion-referenced grading. Geisinger and Rabinowitz (1982) found that faculty identified as "low graders" tended to be more norm-referenced in their orientations. Thus, it seems likely that faculty in disciplines identified as "low grading" would tend to identify more strongly with norm-referenced rather than criterion-referenced beliefs.

Goldman (1985) has suggested that criterion-referenced assessment practices, because they are aligned philosophically with a belief in equality of learning outcomes rather than equality of opportunity (Bloom, 1976, as cited in Goldman, 1985) are incompatible with a "gatekeeping" function of grades. Gatekeeping refers to beliefs that a goal of higher education is to assist society by sorting and selecting students on the basis of talent. For example, an instructor who embraces a gatekeeping role would likely be concerned about grade inflation and would believe that high grades should be reserved for outstanding performance. Therefore, some of the differences in grade elevations among the academic disciplines may reflect discipline-related differences in what faculty view as the most appropriate frame of reference and in their beliefs about the gatekeeping function of grades.

Secondly, it may be that differences in teaching goals among the disciplines are also related to systematic differences in grades assigned. Angelo and Cross (1993) found

that faculty differed predictably by academic discipline on the importance assigned to six clusters of teaching goals. Science and mathematics faculty were more concerned with teaching facts and principles of their disciplines; whereas, faculty in the arts were most likely to view their primary teaching role as fostering student development and personal growth. Similarly, Smart and Elton (1982) found that faculty in so-called soft disciplines (e.g., social sciences, humanities) and those whose disciplines were more concerned with practical application than theory (the applied disciplines) tended to place greater emphasis on the character development and intellectual self-actualization of students than did their colleagues in the "hard" and pure disciplines. To the extent that measurement of student character development in the classroom is less precise and more difficult than measurement of attainment of content, grades based on the former are likely to be higher than grades based on the latter. Further, it is likely that in disciplines where student development is a high priority, faculty are less concerned with using grades as a method of "controlling the gates of learning." The purposes of the present study were to (1) investigate the relationship among beliefs about grades and teaching goals and (2) detect the extent to which there exist systematic differences among the academic disciplines with respect to these beliefs and goals.

Methods

The Faculty Beliefs about Grades Inventory (FBGI; Barnes, 1997) was used to measure faculty members' orientations toward norm-referenced or criterion-referenced grading (the Frame of Reference scale) and beliefs about the sorting and selecting function of grades (the Gatekeeping scale). Items on the FBGI were statements that faculty rated on a 7-point Likert type scale ranging from strongly agree to strongly disagree. On the

FBGI, frame of reference was conceptualized as a bipolar construct with strong criterion-referenced views at one end and and strong norm-referenced views at the other. Higher scores on the 13-item Frame of Reference scale were associated with a more favorable attitude toward norm-referenced grading and low scores associated with a more favorable attitude toward criterion-referenced grading. Higher scores on the 11-item Gatekeeping scale indicated stronger beliefs in gatekeeping. The Teaching Goals Inventory (TGI) developed by Angelo and Cross (1993) asked faculty to rate the importance of six clusters of teaching goals and to identify a primary teaching role. The six goals were higher-order thinking skills, basic academic success skills, discipline-specific knowledge and skills, liberal arts and academic values, work/career placement, and personal development. There were from eight to ten goals within each cluster and each goal was rated on a 5-point scale ranging from "essential--a goal you always/nearly always try to achieve" to "not applicable--a goal you never try to achieve." Higher scores indicated more importance assigned to a goal. Examples of items from the FBGI and the TGI are given in Table 1.

Data were collected in 1997 through a mail survey sent to 1200 faculty randomly selected from a national faculty data base stratified by academic discipline. Targeted faculty were identified as having undergraduate teaching responsibilities. After a follow-up postcard and a second mailing, 442 usable surveys were received constituting a 37% response rate. The actual rate of return was somewhat higher because many of the nonusable returns were from faculty who said they did not teach undergraduate courses; others were returned with too much missing data to be usable. Responses were coded by postmarked date of return. Analyses by date of return showed no differences in responses

or demographics among early returns and late returns. Assuming late returns are similar to non-returns, these findings did not suggest a systematic bias due to nonresponse.

The self-reported academic disciplines of the respondents are displayed in Table 2. The Biglan (1973) model was used to classify disciplines according to a three-way classification—either paradigmatic or preparadigmatic, pure or applied, life or nonlife. Paradigmatic (sometimes referred to as hard, and hereinafter referred to as hard) disciplines are distinguished from preparadigmatic (soft) in that the former have agreed-upon theories and methods guiding their study. Pure and applied disciplines differ with respect to their emphasis on theory versus practical application. The life-nonlife dimension classifies disciplines with respect to their involvement in the study of life systems. Ninety-two percent of the respondents were classifiable within this model. The discipline classifications of the other 8% were ambiguous and these respondents were not included in analyses involving discipline classification. Some groupings were heavily defined by a single content area (e.g., Biology constituted 83% of the hard pure life group). Table 2 shows there were more respondents in the soft pure nonlife and the hard pure disciplines than in the other five groups. We attempted to sample approximately equal numbers of faculty from each of the Biglan classifications, so it is likely that much of this disparity represents differential response rates. However, discipline groupings for sampling purposes were based on the discipline classification system used by the marketing group that supplied the faculty list. Self-reported academic disciplines did not always match the marketing group's classification, thus making it difficult to determine an exact return rate by discipline.

About 55% of the respondents reported teaching primarily introductory courses; 32% taught advanced; and 12% did not report the level. Respondents were overwhelmingly male (74%) and reported an average of 18.5 years of college teaching. Thirty-eight percent reported having had some instruction in classroom assessment.

Results

Scale reliabilities were α=.73 and .83 for the Gatekeeping (GATE) and Frame of Reference (FOR) scales respectively (refer to Table 4). The coefficient for the Gatekeeping scale was lower than the alpha coefficient of .83 found previously, though the FOR scale reliability was very similar to the coefficient of .86 reported by Barnes (1997) for a sample of faculty from two midwest research universities. Alpha reliabilities for the six subscales of the TGI ranged from .72 to .91. These are highly similar to the coefficients reported in Angelo and Cross (1993).

Table 3 shows mean scores for the eight scales for each academic discipline group. The scores are presented as item means--the sum of item responses for each scale divided by the number of items contributing to that scale. Responses to the FOR and GATE scales are interpreted relative to a 7-point scale. For the six scales of the TGI, each item was rated on a 5-point scale. An examination of the FOR scores reveals that in general these respondents were somewhat more criterion-referenced than norm-referenced. An item-level score of 4 is neutral. A score of 5 and above indicates a tendency toward a norm-referenced orientation; whereas, a score of 3 and below suggests a more criterion-referenced orientation. GATE scores suggest a moderate degree of gatekeeping for these respondents. Standard deviations on the FOR scale ranged from .97 to 1.08; on the GATE scale they ranged from .77 to 1.02. The score elevations and variability on these two

scales were similar to those reported previously (Barnes, 1997). Scores on the TGI show that, in general, faculty tended to assign the highest ratings to the goal clusters of higher-order thinking skills (HOTS) and discipline specific skills and knowledge (DSKS). Some of the lowest ratings were assigned to goals in liberal arts and academic values LAAV), work-career planning (WCP) , and personal development (PD). These findings are similar to those reported by Angelo and Cross (1993) on a sample of faculty from 4-year colleges, though their cluster means in general were lower than those reported here. Standard deviations for these scales ranged from .44 to .66 (HOTS), .66 to .85 (Basic Academic Skills; BASS), .51 to .71 (DSKS), .65 to .92 (LAAV), .77 to .96 (WCP), and from .84 to 1.19 (PD). Correlations among the scales are displayed in Table 4. The correlation of .21 between the FOR and GATE scales was lower than the previously reported correlation of . 39 (Barnes, 1997). To some extent this is a function of the lower reliability of the Gatekeeping scale. Though a number of correlations between the TGI and FBGI scales were significant, in general these correlations were small. Correlations among some of the scales of the TGI suggest a substantial degree of overlap. For example, the pattern of correlations among BASS, LAAV, WCP, and PD suggest there may be higher-order goal clusters underlying responses to items on these scales.

A multivariate analysis of variance (MANOVA) of the FOR and GATE scales by the eight discipline groups revealed a significant multivariate effect for discipline (Pillais F (14, 786) = 2.62, $p<.001$). The univariate effect was significant for the Gatekeeping scale ($p<.001$) but not for the Frame of Reference scale. In general, except for soft applied nonlife and hard applied life groups, the soft disciplines had lower gatekeeping scores than faculty in the hard disciplines. Tukey HSD post-hoc analyses showed the two hard pure

discipline groups were significantly more gatekeeping than were faculty in the soft applied life disciplines. The hard pure life faculty were also more gatekeeping than the soft pure nonlife faculty.

A MANOVA on the six scales of the TGI by discipline revealed a significant multivariate difference among the eight groups (Pillais F (42,2346) = 4.28, $p<.001$). A univariate follow-up revealed a significant difference among the eight groups for LAAV—liberal arts and academic values (p,.001), WCP—work/career planning ($p<.004$), and PD—personal development ($p<.001$). Tukey HSD post hoc analyses showed that for LAAV there was a tendency for (1) the soft disciplines to have higher scores than the hard disciplines, (2) the pure disciplines to have higher scores than the applied, and (3) to some extent the life disciplines to have higher scores than nonlife disciplines. The lowest LAAV scores were found in the hard nonlife disciplines and the highest scores in the soft pure nonlife disciplines. Faculty in the hard nonlife groups scored significantly lower than all the soft discipline groups except for soft applied nonlife, and they scored lower than faculty in hard pure life. Hard applied life and hard pure life scored lower than soft pure nonlife. The soft applied nonlife group scored lower on LAAV than all other soft discipline groups. On the PD scale, the four highest scoring groups were the soft disciplines; the soft applied life group scored significantly higher than both hard pure groups. With respect to the WCP scale, the four highest scoring groups were the applied disciplines; the hard applied nonlife and soft applied life groups scored significantly higher than did faculty in the hard pure life disciplines.

Analyses of responses to the question, "how do you see your primary role as a teacher?" also revealed significant discipline-related differences (χ^2 (35) = 100.21, $p<.01$).

Table 5 shows that except for faculty in soft applied disciplines, the two most frequently selected teaching roles were "teaching students facts and principles of the subject matter", and "helping students develop higher-order thinking skills". For the soft applied life disciplines faculty most often selected "teaching higher order thinking skills", but nearly the same number selected "fostering student development and personal growth". For the soft applied nonlife disciplines, the most frequently endorsed teaching role was "preparing students for jobs/careers" and the second most common role was "developing higher-order thinking skills". The findings of this study with respect to teaching goals were similar to those reported by Angelo and Cross (1993), though a higher percentage of our sample selected higher order thinking skills and discipline-specific skills and knowledge (76.6% compared to 56%). This may be due to our sample's overrepresentation of faculty from the HPL and HPN disciplines since these disciplines had the highest percentage of faculty selecting these two teaching roles. Percentages selecting the various teaching roles within the disciplines were similar to those reported by Angelo and Cross (1993).

The relationship of teaching goals to grading beliefs was investigated by grouping faculty according to their primary teaching goal and conducting a MANOVA on the scales of the FBGI. Because so few faculty selected "providing a role model for students" or "helping students develop basic learning skills" as their primary role, the number of groups for analysis was reduced to four. The groups were based on faculty selecting one of the following as their primary teaching role: "teaching students facts and principles of the subject matter", "helping students develop higher-order thinking skills", "preparing students for jobs/careers", or "fostering student development and personal growth." The multivariate test was not significant at the .05 level (Pillais $F(6,810) = 1.934$, $p = .073$).

Given the low probability associated with the multivariate test and that our primary interest was in interpreting individual scales on the FBGI rather than a linear combination of the scales, results of separate oneway ANOVAS were examined using a Bonferoni adjusted alpha level (.05/2 = .025; Harris, 1985). Results showed a significant difference among the groups on the Gatekeeping scale ($F(3,398)=2.66$). A Tukey-HSD test revealed that faculty who viewed their primary teaching role as one of "teaching students facts and principles of the subject matter" had significantly higher gatekeeping scores ($\overline{X}=4.31$) than those who identified "fostering student development and personal growth" as their primary role($\overline{X}=3.88$).

Discussion

The results of this study are quite consistent with previous research that has examined the relationship between teaching goals and academic disciplines (Angelo and Cross, 1993; Smart & Elton, 1982). We found clear discipline differences in the emphasis faculty give to various teaching goals—in particular the goals involving liberal arts and academic values, work/career planning, and personal development. Though differences emerged through comparison of means on the goal clusters, the strongest differences were noted in the percentages of faculty selecting various teaching goals. Consistent with previous research, we found that faculty in soft applied life disciplines (e.g., education, arts) were more inclined to see their roles as involving personal development than were faculty in other disciplines; and faculty in soft applied nonlife (business) rated their top teaching priority as preparing students for jobs and careers.

This study sought to go beyond looking at teaching goals in isolation and to examine the relationship between teaching goals and beliefs about grading practices.

Previous research has shown that grades in science and math courses on average tend to be lower than grades in courses in education and the humanities (e.g., Goldman & Widawski, 1976). We found faculty with the highest gatekeeping belief scores to be in the pure hard disciplines which were composed of math and science faculty, and those with the lowest gatekeeping beliefs to be in soft applied life disciplines (e.g., education, music). The latter also tended to have the lowest professed beliefs in norm-referenced grading though the difference was not statistically significant. Further, faculty who saw their primary role as furthering personal development were less gatekeeping in their orientation than were those who saw their primary role as teaching facts and principles of the subject matter. As previously noted, the faculty most likely to emphasize personal development as a teaching goal were those in soft applied life disciplines—faculty with lower gatekeeping attitudes and reportedly higher average grades; whereas faculty most likely to select facts and principles of subject matter were those in the hard pure disciplines—faculty with higher gatekeeping attitudes and reportedly lower average grades.

Though the relationship between gatekeeping and actual grades assigned was not examined in this study, the literature is converging to suggest that faculty tend to grade in a manner consistent with their beliefs about the meaning and purpose of grades. Those who believe that high average grades in a class reflect low standards rather than excellent teaching will develop a grading and assessment scheme that maintains a somewhat lower average grade. On the other hand, faculty who believe that all or most students can achieve excellence in a class tend to assess and assign grades consistent with that belief. The relationship between teaching goals and gatekeeping beliefs may reflect that, in comparison to promoting personal develoment, the teaching of facts and principles is

better suited to traditional assessment methods (e.g., tests, quizzes, assignments). Measuring development and personal growth is complex ; procedures are not well-established and teacher-developed measures have questionable reliability and validity. Further, most assessment specialists strongly caution against basing grades on anything other than achievement (e.g., Nitko, 1996, p. 326). Thus, faculty would be understandably cautious about assigning low grades on the basis of perceived inadequate personal development. Moreover, the devaluing of the sorting and selection function of grades is consistent with a belief system that places the highest value on promoting student development and personal growth.

These results demonstrate the impact that socialization into academic disciplines has on the development of young faculty members (Clark, 1987). In summarizing their work on measuring faculty teaching goals, Angelo and Cross (1993) wrote,

> One important finding, which emerged without equivocation from all of our work with the TGI, is that faculty teaching priorities are related more to academic discipline than to any other factor. Teachers of a given discipline—whether male or female, full-time or part-time, experienced or inexperienced, teaching in a public community college or a private four-year college—share a value system with respect to teaching goals that is distinctively discipline-related and significantly different from that of colleagues in other disciplines. (p. 366).

To a large extent, beliefs about teaching goals and beliefs about grades are embedded in the cultures of the academic disciplines. Faculty develop many of their beliefs

about teaching and learning while they are students -- they learn from those by whom they are taught. They absorb the attitudes and model the practices. Thus, the traditions are transmitted from one generation to the next, perhaps largely unchallenged and unexamined. Unfortunately, most faculty have never had formal instruction in classroom teaching or assessment - indeed only 38% of this study's sample reported having had any assessment training.

The findings of this study raise a number of questions. How do these attitudes translate into practice? Do faculty with higher gatekeeping attitudes assign lower grades? Goldman and Widawski (1976) reported that 53% of the variance in grading standards among the disciplines was attributable to differences in past performance and abilities of students such that fields awarding lower grades tended to attract and retain students with higher pre-college achievement indices. How much of the discipline-specific variance in grade elevations is attributable to differences in teaching goals and grading philosophies and how much is attributable to mutual adaptation on the part of faculty and students? A related issue is whether differences in gatekeeping beliefs represent true philosophical differences or whether these attitudes evolved as post-hoc justification for grading practices that are really adaptation-level phenomena. The discipline-related differences in beliefs about teaching goals and the relationship between teaching goals and grading beliefs lend credibility to the suggestion that these findings represent legitimate discipline-related differences in grading philosophy.

References

Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers, 2nd ed.* San Francisco: Jossey-Bass.

Barnes, L. L. B. (1997). Development of the faculty beliefs about grades inventory. *Educational and Psychological Measurement, 57,* 459-468.

Biglan, A. (1973). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology, 57,* 195-203.

Clark, B. R. (1987). *The academic life: Small worlds, different worlds.* Princeton: The Carnegie Foundation for the Advancement of Teaching.

Geisinger, K. F., & Rabinowitz, W. (1982). Individual differences among college faculty in grading. *Journal of Instructional Psychology, 7*(1), 20-27.

Goldman, L. (1985). The betrayal of the gatekeepers: Grade inflation. *The Journal of General Education, 37,* 97-121.

Goldman, R. D., & Widawski, M. H. (1976). A within-subjects technique for comparing college grading standards: Implications in the validity of the evaluation of college achievement. *Educational and Psychological Measurement, 36,* 381-390.

Goldman, R. D., & Hewitt, B. N. (1975). Adaptation-level as an explanation for differential standards in college gradings. *Journal of Educational Measurement, 11,* 343-357.

Harris, R. J. (1985). *A primer of multivariate statistics, 2nd ed.* Orlando: Academic Press.

Milton, O., Pollio, H. R., & Eison, J. A. (1986). *Making sense of college grades: Why the grading system does not work and what can be done about it.* San Francisco: Jossey-Bass.

Nitko, A. J. (1996). *Educational assessment of students*, (2nd Ed). Merrill: Englewood Cliffs, NJ.

Smart, J. C., & Elton, C. F. (1982). Validation of the Biglan model. *Research in Higher Education, 17*(3), 213-229.

Strenta, A. C., & Elliott, R. (1987). Differential grading standards revisited. *Journal of Educational Measurement, 24*, 281-291.

Summerville, R. M., Ridley, D. R., & Maris, T. L. (1990). Grade inflation: The case of urban colleges and universities. *College Teaching, 38* (91) 33-38.

Table 1

Example Items from the Faculty Survey

Scale	Description
Frame of Reference	A grade should reflect the degree to which a student has mastered course objectives without regard for his or her ranking in the class. (Reverse)
	I do not believe in "curving" the grades.
Gatekeeping	Generally, a high percentage of "A's" in a class indicates low standards or a lack of rigor in assessing achievement.
	The distribution of scores on a well-written major exam following effective instruction should be "piled up" at the upper end of the scale range. (Reverse)
Higher-order Thinking	Develop ability to apply principles and generalizations already learned to new problems and situations.
	Develop analytic skills.
Basic Academic Success Skills	Improve skill at paying attention.
	Improve memory skills.
Discipline-Specific Skills and Knowledge	Learn terms and facts of this subject.
	Learn concepts and theories in this subject.
Liberal Arts and Academic Values	Develop an appreciation of the liberal arts and sciences.
	Develop an openness to new ideas.
Work/Career Preparation	Develop ability to work productively with others.
	Develop management skills
Personal Development	Cultivate a sense of responsibility for one's own behavior.
	Improve self-esteem/self-confidence

Table 2

Biglan classification of academic disciplines

	Soft		Hard	
	Pure	Applied	Pure	Applied
Life	Geography Poli Science Psychology Sociology (n=35)	Architecture Art Education[a] Fine Arts Music Nutrition Theatre (n=41)	Biology[b] Botany Ecology Entomology Envir Science Physiology Zoology (n=82)	Agriculture Forestry (n=36)
Nonlife	Classics English Foreign Lang History[c] Philosophy Religion Speech (n=79)	Accounting Economics[d] Finance Management Marketing (n=26)	Chemistry[e] Geology Mathematics[f] Physics (n=75)	Atmos Science Comp Science[g] Engineering[h] (n=37)

[a,b,c,d,e,f,g,h] These content areas represented a substantial percentage of the responses in their respective discipline groups. The percentages are 40%, 83%, 34%, 39%, 41%, 41%, 62%, and 62% respectively.

Table 3

Scale means by academic discipline group

	Soft				Hard			
	Applied		Pure		Applied		Pure	
	Life	Non-life	Life	Non-life	Life	Non-life	Life	Non-life
FOR	2.98	3.57	3.37	3.21	3.50	3.41	3.46	3.42
GATE*	3.69	4.15	4.06	3.97	3.91	4.20	4.41	4.37
HOTS	4.29	4.25	4.37	4.27	4.09	4.15	4.20	4.13
BASS	3.03	3.00	3.17	3.31	3.06	3.17	3.04	3.16
DSKS	3.84	3.73	3.80	3.54	3.62	3.71	3.65	3.56
LAAV*	3.43	2.70	3.38	3.56	2.91	2.59	3.16	2.54
WCP*	3.40	3.38	3.14	3.02	3.16	3.45	2.85	3.02
PD*	3.77	3.31	3.38	3.26	3.09	3.22	2.94	2.83

Note: FOR=Frame of Reference; GATE=Gatekeeping; HOTS=Higher-order Thinking Skills; BASS=Basic Academic Success Skills; DSKS=Discipline-specific Knowledge and Skills; LAAV=Liberal Arts and Academic Values; WCP=Work/Career Placement; PD=Personal Development.

* indicates significant differences among disciplines on this scale.

Table 4

Scale reliability coefficients and correlations among scales

	FOR	GATE	HOTS	BASS	DSKS	LAAV	WCP	PD
FOR	*.73*							
GATE	.21**	*.83*						
HOTS	-.11*	-.09	*.76*					
BASS	-.07	-.02	.41**	*.82*				
DSKS	-.05	-.12*	.37**	.34**	*.72*			
LAAV	-.08	-.15*	.45**	.41**	.33**	*.87*		
WCP	-.13*	-.09*	.27**	.56**	.38**	.33**	*.87*	
PD	-.11*	-.16**	.42**	.50**	.32**	.62**	.73**	*.91*

Note: *p<.05; **p<.01. Alpha coefficients on the diagonal.

Table 5

Percent in each discipline group selecting primary teaching role

	SAL	SAN	SPL	SPN	HAL	HAN	HPL	HPN	Total
HOTS	30.8	28.0	45.5	48.1	36.1	35.1	39.0	46.6	40.5
FACTS	17.9	12.0	30.3	26.0	33.3	29.7	47.6	42.5	33.1
SD	28.2	8.0	15.2	18.2	8.3	5.4	6.1	4.1	11.2
JOBS	12.8	32.0	6.1	1.3	16.7	27.0	2.4	5.5	9.5
BASS	2.6	8.0	3.0	3.9	2.8	2.7	2.4	1.4	3.0
ROLE	7.7	12.0	0.0	2.6	2.8	0.0	2.4	0.0	2.7

Note: S = Soft, H = Hard; A = Applied, P = Pure; L = Life, N = Nonlife. HOTS = Helping students develop higher-order thinking skills; FACTS = Teaching students facts and principles of the subject matter; SD = Fostering student development and personal growth; JOBS = Preparing students for jobs/careers; BASS = Helping students develop basic learning skills; ROLE = Providing a role model for students.